

Bloom's Taxonomy

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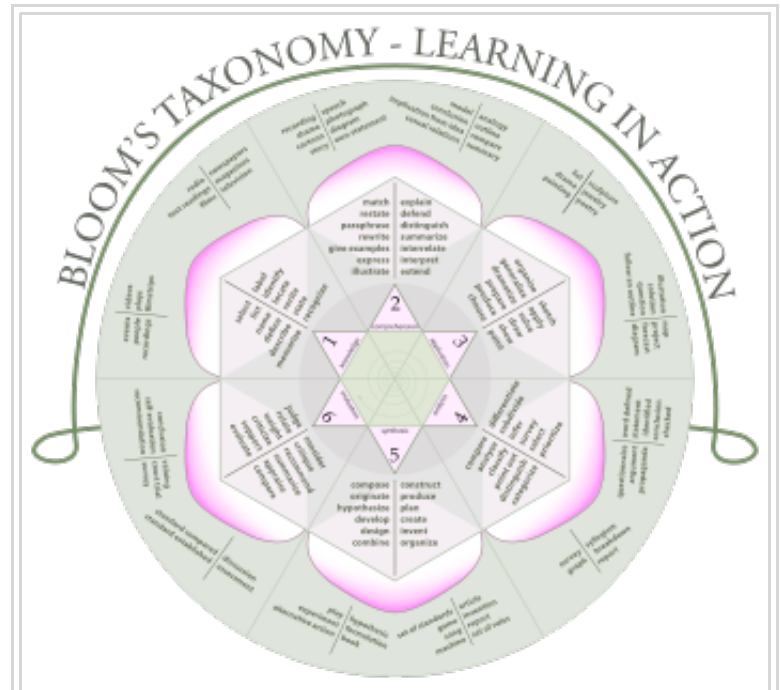
Bloom's Taxonomy is a classification of learning objectives within education proposed in 1956 by a committee of educators chaired by Benjamin Bloom who also edited the first volume of the standard text, *Taxonomy of educational objectives: the classification of educational goals*^[1] (referred to as simply "the Handbook" below). Although named for Bloom, the publication followed a series of conferences from 1949 to 1953, which were designed to improve communication between educators on the design of curricula and examinations^{[2][3]}.

It refers to a classification of the different objectives that educators set for students (learning objectives). Bloom's Taxonomy divides educational objectives into three "domains": Cognitive, Affective, and Psychomotor (sometimes loosely described as *knowing/head*, *feeling/heart* and *doing/hands* respectively). Within the domains, learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels^[4]. A goal of Bloom's Taxonomy is to motivate educators to focus on all three domains, creating a more holistic form of education^[1].

A revised version of the taxonomy was created in 2000^{[5][6][7]}.

Bloom's Taxonomy is considered to be a foundational and essential element within the education community as evidenced in the 1981 survey *Significant writings that have influenced the curriculum: 1906-1981*, by H.G. Shane and the 1994 yearbook of the National Society for the Study of Education.

A mythology has grown around the taxonomy, possibly due to many people learning about the taxonomy through second hand information. Bloom himself considered the Handbook^[1], "one of the most widely cited yet least read books in American education"^[3].



The Bloom's Wheel, according to the Bloom's verbs and matching assessment types. The verbs are intended to be feasible and measurable.

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Domains

Key to understanding the taxonomy and its revisions, variations, and addenda over the years is an understanding that the original Handbook^[1] in 1956 was intended only to focus on one of the three domains (as indicated in the domain specification in title: *The Taxonomy of Educational Objectives: Handbook I: Cognitive Domain*), but there was expectation that additional material would be generated for the other domains (as indicated in the numbering of the handbook in the title).

The second volume, *Handbook II: Affective Domain* edited by David Krathwohl was published in 1964^[8].

There was no Handbook III for the Psychometric domain published by the committee as the consensus was that (as college level academics) they lacked the necessary experience to do the job properly^[3]. Substitute domain taxonomies have been published by various authors^{[9][10][11]} to fill the gap.

Bloom also considered the initial effort to be a starting point, as evidenced in a memorandum from 1971 in which he said, "Ideally each major field should have its own taxonomy in its own language - more detailed, closer to the special language and thinking of its experts, reflecting its own appropriate sub-divisions and levels of education, with possible new categories, combinations of categories and omitting categories as appropriate."^[5]

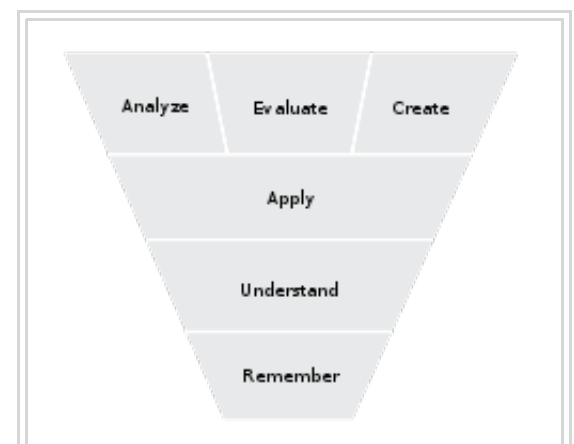
Cognitive

Skills in the **cognitive domain** revolve around knowledge, comprehension, and critical thinking of a particular topic. Traditional education tends to emphasize the skills in this domain, particularly the lower-order objectives.

There are six levels in the taxonomy, moving through the lowest order processes to the highest:

Knowledge

Exhibit memory of previously-learned materials by recalling facts, terms, basic concepts and answers



- Knowledge of specifics - terminology, specific facts
- Knowledge of ways and means of dealing with specifics - conventions, trends and sequences, classifications and categories, criteria, methodology
- Knowledge of the universals and abstractions in a field - principles and generalizations, theories and structures

Categories in the cognitive domain of Bloom's Taxonomy (Anderson & Krathwohl, 2001)

Questions like: What are the health benefits of eating apples?

Comprehension

Demonstrative understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas

- Translation
- Interpretation
- Extrapolation

Questions like: Compare the health benefits of eating apples vs. oranges.

Application

Using new knowledge. Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way

Questions like: Which kinds of apples are best for baking a pie, and why?

Analysis

Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations

- Analysis of elements
- Analysis of relationships
- Analysis of organizational principles

Questions like: List four ways of serving foods made with apples and explain which ones have the highest health benefits. Provide references to support your statements.

Synthesis

Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions

- Production of a unique communication
- Production of a plan, or proposed set of operations
- Derivation of a set of abstract relations

Questions like: Convert an "unhealthy" recipe for apple pie to a "healthy" recipe by replacing your choice of ingredients. Explain the health benefits of using the ingredients you chose vs. the original

ones.

Evaluation

Present and defend opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria

- Judgments in terms of internal evidence
- Judgments in terms of external criteria

Questions like: Do you feel that serving apple pie for an after school snack for children is healthy? Why or why not?

Affective

Skills in the **affective domain** describe the way people react emotionally and their ability to feel another living thing's pain or joy. Affective objectives typically target the awareness and growth in attitudes, emotion, and feelings.

There are five levels in the affective domain moving through the lowest order processes to the highest:

Receiving

The lowest level; the student passively pays attention. Without this level no learning can occur.

Responding

The student actively participates in the learning process, not only attends to a stimulus; the student also reacts in some way.

Valuing

The student attaches a value to an object, phenomenon, or piece of information.

Organizing

The student can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned.

Characterizing

The student holds a particular value or belief that now exerts influence on his/her behaviour so that it becomes a characteristic.

Psychomotor

Skills in the **psychomotor domain** describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and/or development in behavior and/or skills.

Bloom and his colleagues never created subcategories for skills in the psychomotor domain, but

since then other educators have created their own psychomotor taxonomies.^[12] Simpson (1972) among other contributors, such as Harrow (1972) and Dave (1967), created a Psychomotor Taxonomy that helps to explain the behavior of typical learners or high performance athletes. The proposed levels are:

1. Perception: *The ability to use sensory cues to guide motor activity.* This ranges from sensory stimulation, through cue selection, to translation. Examples: Detects non-verbal communication cues. Estimate where a ball will land after it is thrown and then moving to the correct location to catch the ball. Adjusts heat of stove to correct temperature by smell and taste of food. Adjusts the height of the forks on a forklift by comparing where the forks are in relation to the pallet. Key Words: chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects.

2. Set: Readiness to act. *It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations* (sometimes called mindsets). Examples: Knows and acts upon a sequence of steps in a manufacturing process. Recognize one's abilities and limitations. Shows desire to learn a new process (motivation). NOTE: This subdivision of Psychomotor is closely related with the "Responding to phenomena" subdivision of the Affective domain. Key Words: begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.

3. Guided Response: *The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.* Examples: Performs a mathematical equation as demonstrated. Follows instructions to build a model. Responds hand-signals of instructor while learning to operate a forklift. Key Words: copies, traces, follows, react, reproduce, responds

4. Mechanism: This is the intermediate stage in learning a complex skill. *Learned responses have become habitual and the movements can be performed with some confidence and proficiency.* Examples: Use a personal computer. Repair a leaking faucet. Drive a car. Key Words: assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.

5. Complex Overt Response: *The skillful performance of motor acts that involve complex movement patterns.* Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players are often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football, because they can tell by the feel of the act what the result will produce. Examples: Maneuvers a car into a tight parallel parking spot. Operates a computer quickly and accurately. Displays competence while playing the piano. Key Words: assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches. NOTE: The Key Words are the same as Mechanism, but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc.

6. Adaptation: *Skills are well developed and the individual can modify movement patterns to fit special requirements.* Examples: Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners. Perform a task with a machine that it was not originally

intended to do (machine is not damaged and there is no danger in performing the new task). Key Words: adapts, alters, changes, rearranges, reorganizes, revises, varies.

7. Origination: *Creating new movement patterns to fit a particular situation or specific problem.* Learning outcomes emphasize creativity based upon highly developed skills. Examples: Constructs a new theory. Develops a new and comprehensive training programming. Creates a new gymnastic routine. Key Words: arranges, builds, combines, composes, constructs, creates, designs, initiate, makes, originates.

Definition of Knowledge

In to appendix to Handbook I, there is a definition of knowledge which serves as the apex for an alternative, summary classification of the educational goals. This is significant as the Taxonomy has been called upon significantly in other fields such as knowledge management, potentially out of context

“ Knowledge, as defined here, involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting. (Bloom et al. 1956 p 201) ”

The taxonomy is set out:

- 1.00 Knowledge
- 1.10 Knowledge of Specifics
 - 1.11 Knowledge of Terminology
 - 1.12 Knowledge of Specific Facts
- 1.20 Knowledge of Ways and Means of Dealing with Specifics
 - 1.21 Knowledge of Conventions
 - 1.22 Knowledge of Trends and Sequences
 - 1.23 Knowledge of Classifications and Categories
 - 1.24 Knowledge of Criteria
 - 1.25 Knowledge of Methodology
- 1.30 Knowledge of The Universals and Abstractions in a Field
 - 1.31 Knowledge of Principles and Generalizations
 - 1.32 Knowledge of Theories and Structures (Bloom et al. 1956 p 201–204)

Criticism of the Taxonomy

As Morshead^[13] pointed out on the publication of the second volume, the classification wasn't a properly constructed taxonomy, as it lacked a systemic rationale of construction.

This was subsequently acknowledged in the discussion of the original taxonomy by Krathwohl et al in the revision of the taxonomy^[5] and the taxonomy reestablished on more systematic lines. It is generally considered that the role the taxonomy played in systematising a field was more important than any perceived lack of rigour in its construction.

Some critiques of Bloom's Taxonomy's (cognitive domain) admit the existence of these six

categories, but question the existence of a sequential, hierarchical link.^[14] Also the revised edition of Bloom's taxonomy has moved Synthesis in higher order than Evaluation. Some consider the three lowest levels as hierarchically ordered, but the three higher levels as parallel.^[5] Others say that it is sometimes better to move to Application before introducing concepts^[citation needed]. This thinking would seem to relate to the method of problem-based learning.

Further Reading

- Anderson, Lorin W. & Lauren A. Sosniak, eds. (1994), *Bloom's Taxonomy: A Forty-Year Retrospective*. Chicago National Society for the Study of Education

See also

- Educational psychology
- Educational technology
- Higher order thinking skills
- Mastery learning
- Physical education
- David Krathwohl
- Fluid and crystallized intelligence
- Information Hierarchy (DIKW)

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- [^] Bloom et al, (1956) p. 4 "The idea for this classification system was formed at an informal meeting of college examiners attending the 1948 American Psychological Association Convention in Boston. At this meeting, interest was expressed in a theoretical framework which could be used to facilitate communication among examiners. This group felt that such a framework could do much to promote the exchange of test materials and ideas about testing. In addition, it could be helpful in stimulating research on examining and on the relations between examining and education. After considerable discussion, there was agreement that such a theoretical framework might best be obtained through a system of classifying the goals of the educational process, since educational objectives provide the basis for building curricula and tests and represent the starting point for much of our educational research."
- [^] **a b c** Bloom, Benjamin S. *Reflections on the development and use of the taxonomy* in Anderson, Lorin W. & Lauren A. Sosniak, eds. (1994), *Bloom's Taxonomy: A Forty-Year Retrospective*. Chicago National Society for the Study of Education
- [^] Orlich, et al. (2004) *Teaching Strategies: A Guide to Effective Instruction*, Houghton Mifflin
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13. ^ Morshead, Richard W. (1965) Taxonomy of Educational Objectives Handbook II: Affective Domain. Studies in Philosophy and Education vol. 4 (1) pp. 164-170
14. ^ Paul, R. (1993). Critical thinking: What every person needs to survive in a rapidly changing world (3rd ed.). Rohnert Park, California: Sonoma State University Press.

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